Remedy Optimization at Jackson Park Housing Complex NEX Gas Station and Regulatory Acceptance

Presented By
Phil Nenninger & Jennifer Segura
Naval Facilities Engineering Command (NAVFAC) NW & NAVFAC EXWC

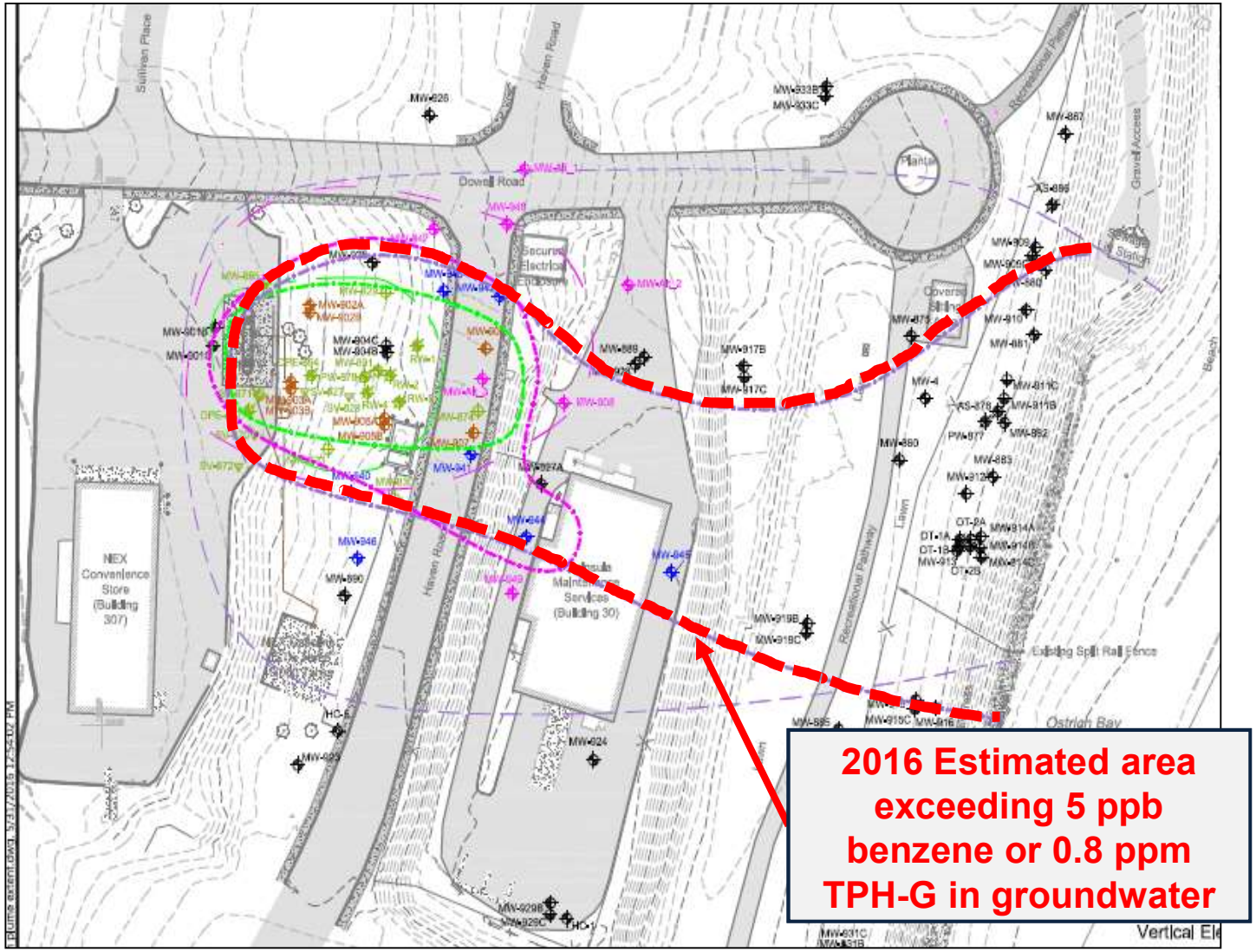
Objective

- **Remedy optimization.**
- **How to involve your regulators and stakeholder team to advance projects faster and develop a path forward.**

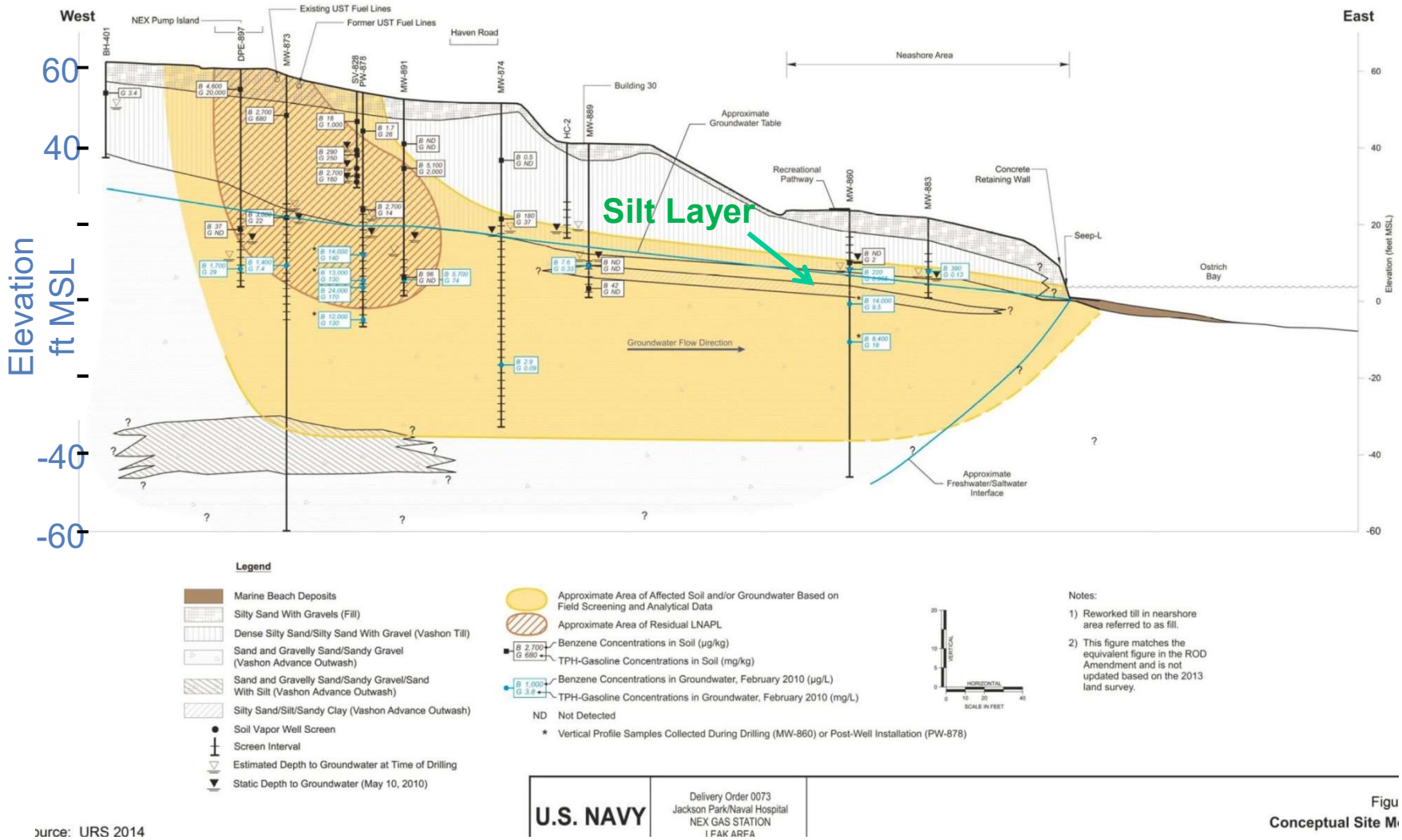
What has worked at Jackson Park Housing Complex (JPHC) NEX

  - **Communication**
  - **Cooperation**

Site Layout and Plume Map



Cross-sectional view of JPHC



ource: URS 2014

Site History Timeline

1981	NEX Underground Storage Tanks (USTs) Installed
1991	Potential 'Benzene Seep' discharging to bay at shoreline
1995	Replaced USTs
2000	ROD Signed, designated treatment ORC failed
2010	Free Product Recovery System Installed (~1 gal/yr)

Site History Timeline

2013	Amended ROD Signed
2015	Data Gap Investigation
2016	Fuel Sales Ended, Portfolio Optimization and Feasibility Analysis
2017	ERH Installation and Operation, MNA/NSZD Evaluation

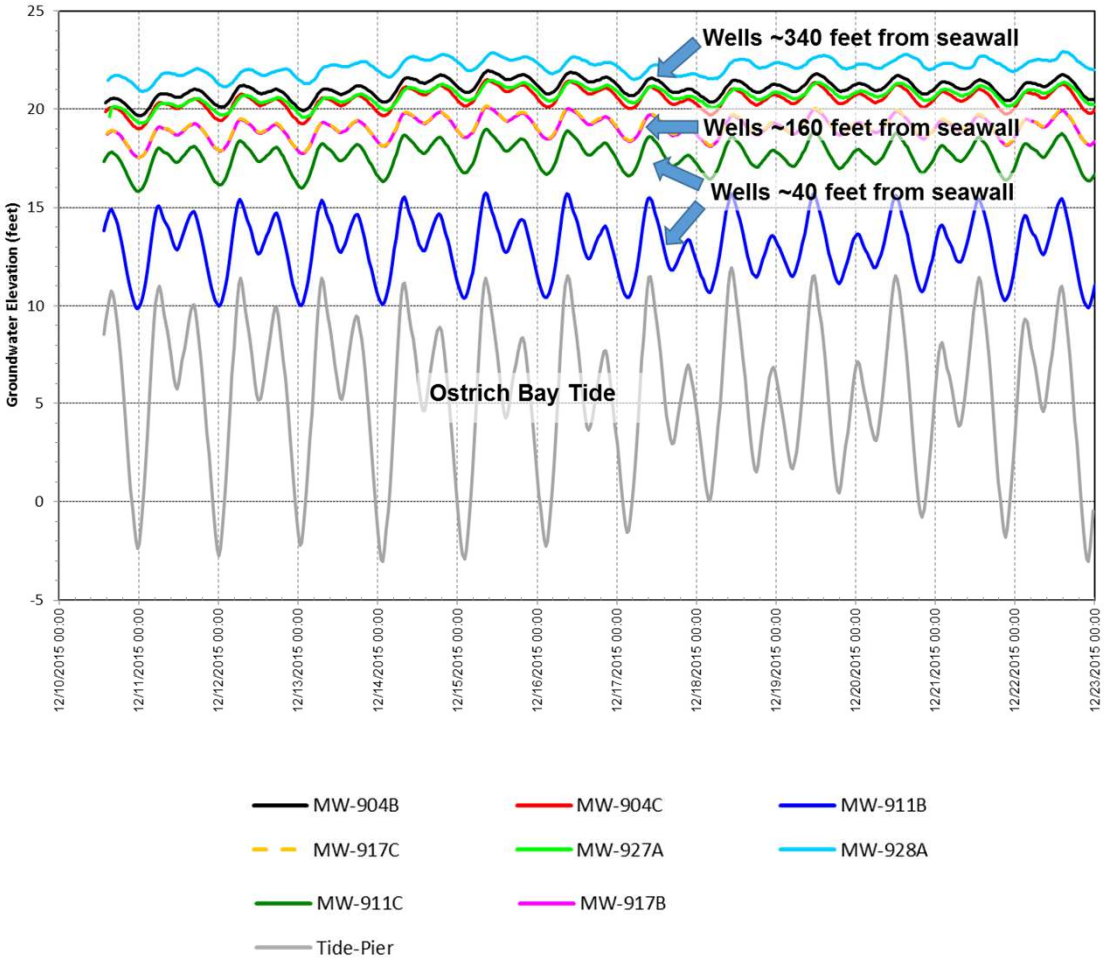
JPHC Amended ROD

- **Signed in Fall of 2013**
- **Remedy Components:**
  1) **ERH in Source Area**
  2) **Ozone at shoreline**
  3) ***Contingency Remedy*** **– if Ozone doesn't work within 2 years pump and treat to be implemented at Nearshore/shoreline area.**

Data Gap Investigation (DGI)

Findings and Observations

- **Contamination deeper and wider than anticipated**
- **Site heavily tidally influenced**
  - **6 ft - *shoreline***
  - **2 ft - *source area***
- **Groundwater velocity greater than 10 ft/day at shoreline**



Project History

- **Pilot testing of Ozone system showed ozone sparging not effective, hicon ozone water injection did remediate benzene, but over limited area due to groundwater movement.**
- **Run constantly due to migrating contaminant flow into shoreline area.**

Jackson Park Remedy Optimization

- December 2015 involved EXWC to evaluate ozone injection system design.
- 2016 Jackson Park Site 101 incorporated as an ad hoc Portfolio Optimization Site.
- Feasibility Analysis of Ozone Injection System with Groundwater Modeling completed in 2016.
- Post ERH analysis to support path forward
  - Pore water sampling event
  - Groundwater monitoring plan post ERH
  - Carbon trap deployment
  - Microbial community analysis

Project Team

JPHC Petroleum Remediation:

CERCLA Petroleum Remediation at Former NEX Gas Station.

Other Stakeholders –

- **Consultant**
- **EPA – Lead Regulatory Agency**
- **Suquamish Tribe**
- **Washington State Department of Natural Resources**

Communication

Project Team Meetings

- **Navy Approach:**
  - **Put everything on the table - the Good, Bad and Ugly.**
  - **Engage and utilize the team members and stakeholders :**
    - **Been involved with site for over a decade**
    - **Have additional resources**
    - **Bring other experience to the table**
  - **Fully respect and appreciate where the different views are coming from.**

Communication

Project Team Meetings

- **Began anew when field work began in June 2015. New RPM.**
- **Told all team members their input was not only appreciated, but expected. Everyone has a voice. Every voice is valuable.**
- **Everyone on goal to advance these two projects (Near shore/Source Area) as quickly as possible.**
- **Kept in conversations throughout DGI, pilot testing, modeling, etc.**
- **Encouraged the team to provide input on where to go next……**

Communication

Project Team Meetings

In the beginning:

- **Relationship with regulatory community had to be redeveloped – Regulator felt Navy had been ignoring advice/directives/reality.**
- **Held weekly on phone and on site.**
- **EPA mentioned Pump and Treat at shoreline 2-3 times per meeting.**
- **DGI work plan had to be altered numerous times to reallocate, and redistribute wells to delineate plume.**

Communication

Project Team Meetings

- **Worked at ensuring stakeholders had information they needed.**
- **Gave credit where due.**
- **Continually work on relationship.**

- **State if Navy policy/issues would not permit action.**
- **Keep them informed (email).**
- **Know when to deliver news in person.**

Path Forward

P-Opt Consensus June 2016 and status update

- **Site conditions have changed and conceptual site model needs to be updated**
  - **Characterize site conditions and assess risk of remaining LNAPL**
    - Preliminary GWSWI Investigation conducted September 2016
    - Natural Source Zone Depletion analysis conducted 2016 / 2017
  - **Better characterize groundwater chemistry in 800 / 900 series wells**
    - *Additional geochemical parameters incorporated into monitoring, 2016/2017*
    - *Supplemental monitoring to be conducted for MNA/NSZD/ERH analysis, 2017*
  - **Reevaluate ARARs based on revised site conditions**

Path Forward

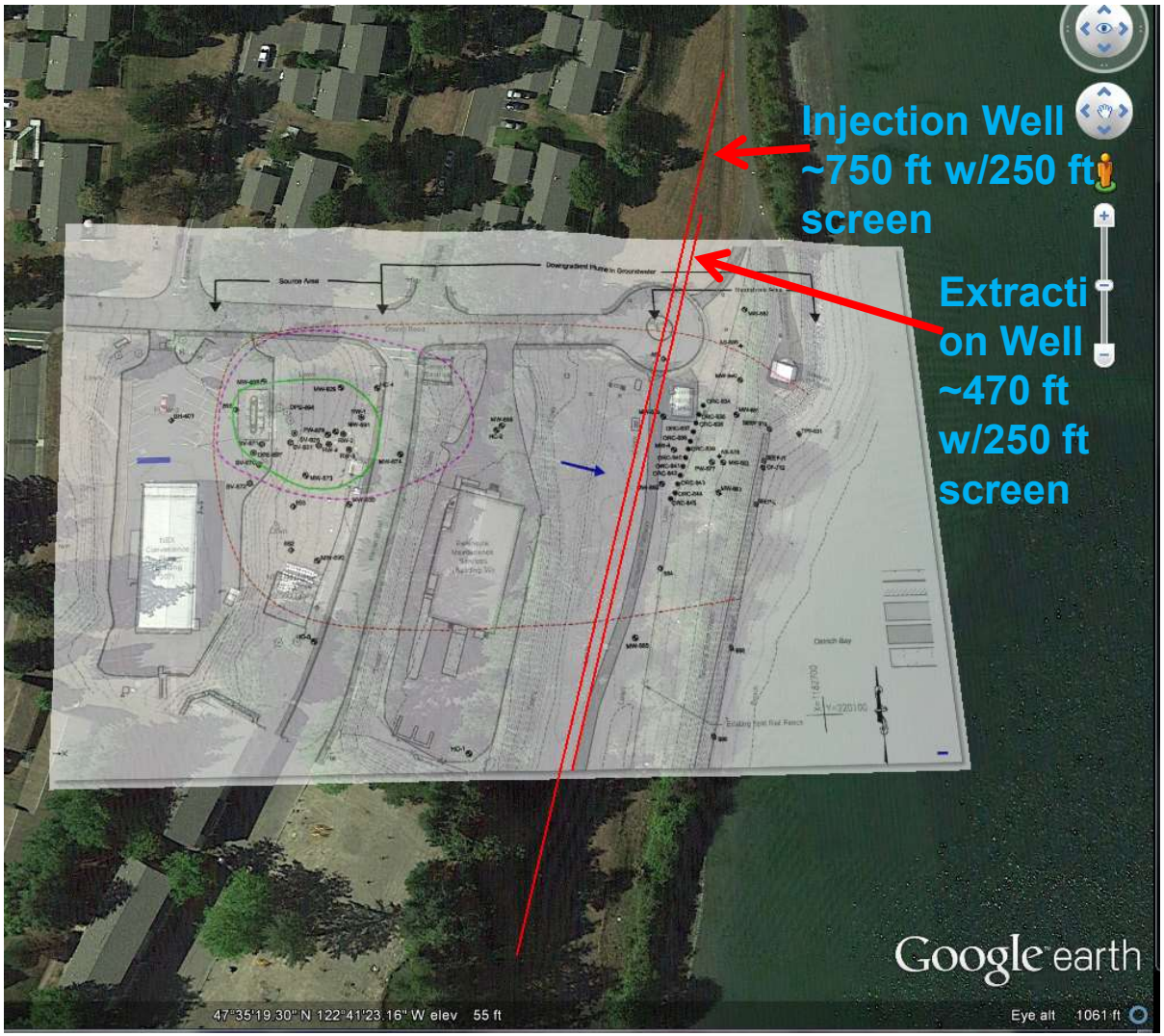
P-Opt Consensus June 2016 and status update

- **Source Area**
  - **Modify ERH/DPE ones to target highest concentration area with migrating LNAPL**
    - *ERH modified to Zone 1 and Zone 2 (greater area, shallower depth)*
  - **Perform field pilot study to address remaining hot spot areas**
    - *Additional source area treatment and Nearshore remedy alternatives to be evaluated following the post ERH operation assessment (6-9 months following source area treatment), 2017*

- **Shoreline Area**
  - **Evaluate and implement shoreline remediation to extent necessary based on the results of the data gap investigation and performance of the source area remedy.**
    - *Regulator and stakeholder concurrence to evaluate impact of ERH for 6-9 months following ERH operation to determine path forward*

Modeling and Evaluation of an Ozone Injection System at JPHC

- Groundwater modeling conducted in 2016
- Stakeholder meeting held October 2016 to discuss findings and develop path forward



October 2016 Stakeholder Meeting Outcome JPHC Path forward

Shoreline remedy not being implemented.

Path Forward Overall Approach:

1. Implement ERH Project Zones 1 and 2
2. Supplemental Evaluation of Plume Response, 6 – 9 months post ERH
3. Supplemental Design to manage plume discharge to Bay
    1. Baseline P&T Conceptual Design
    2. Conceptual Design for alternate technologies, if appropriate

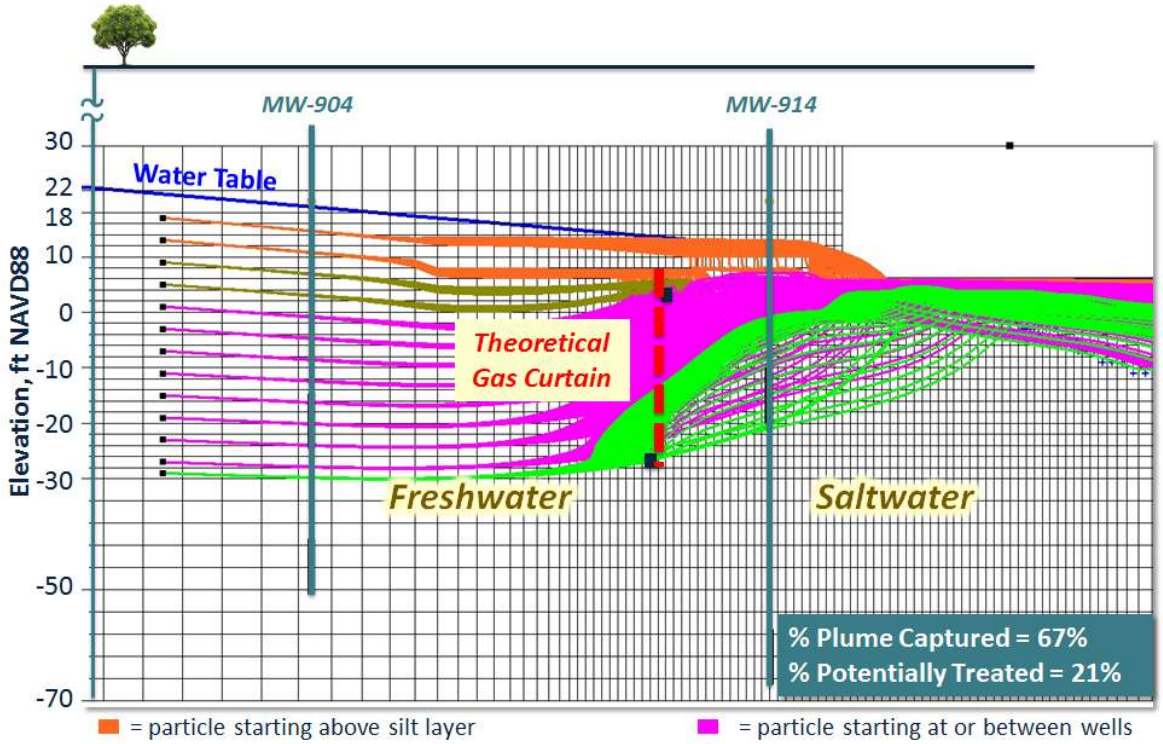
        -ORC, Air Sparging, Attenuation, ERH

Communication

How did this benefit the Navy

- More minds/experts working on the project.
- Better ideas (Plus some not so good ones).
- Flexibility.

Ozone injection modeling



Communication

Flexibility -

Remember the ROD?

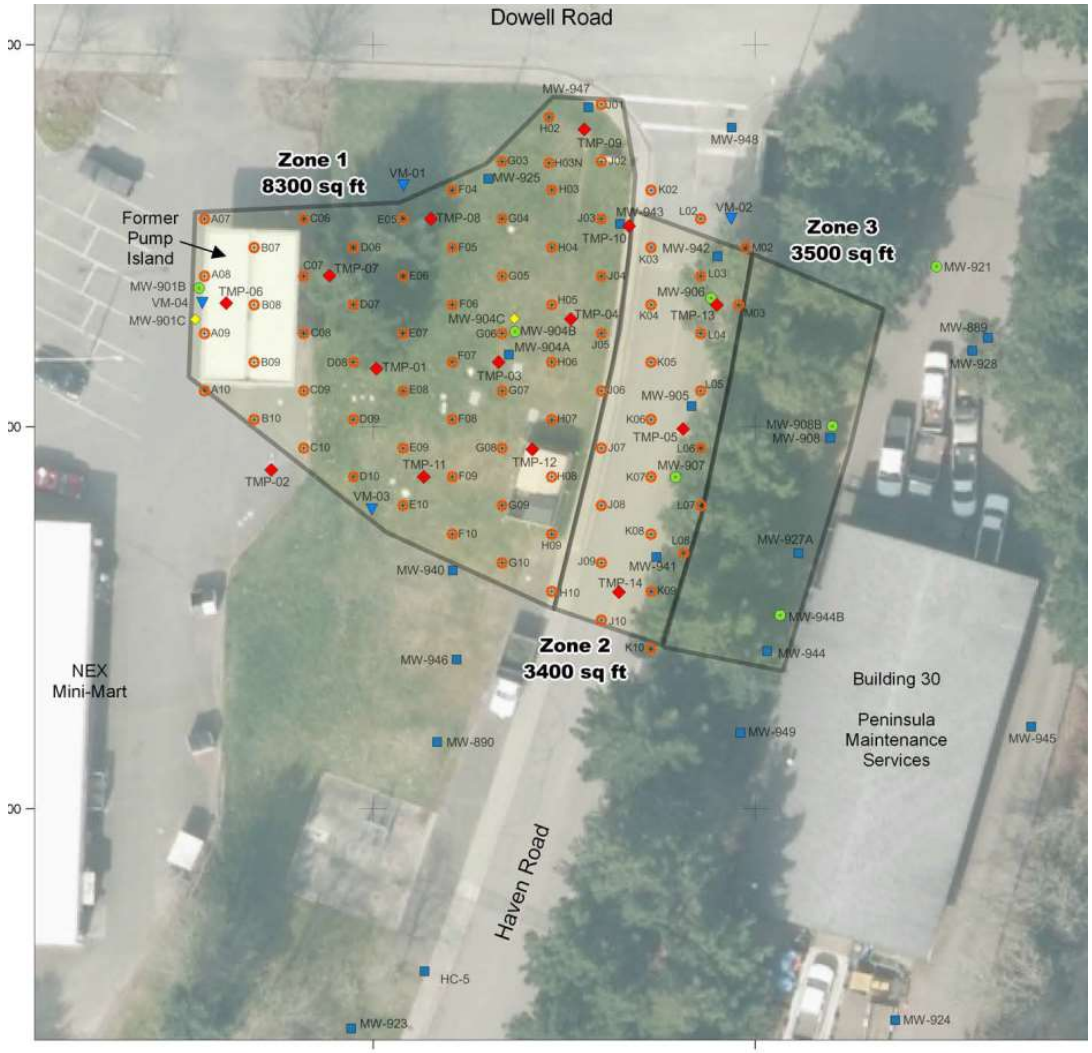
- ERH in Source Area.
- Ozone in Shoreline – if Ozone doesn't work in two years, install Pump and Treat.
- EPA was mentioning Pump and Treat 2-3 times per meeting.

Progress

- Multiple “on the fly” changes during DGI.
- Installation of ERH began prior to finalization of Source Area Remedial Action Work Plan.
- Work Plan went from Draft to Final (No Draft Final)
- Regulator no longer mentions Pump and Treat.
- Alternate “polishing” remedies being discussed if needed.

Progress

Anticipate an ESD to be prepared instead of Amending ROD again.

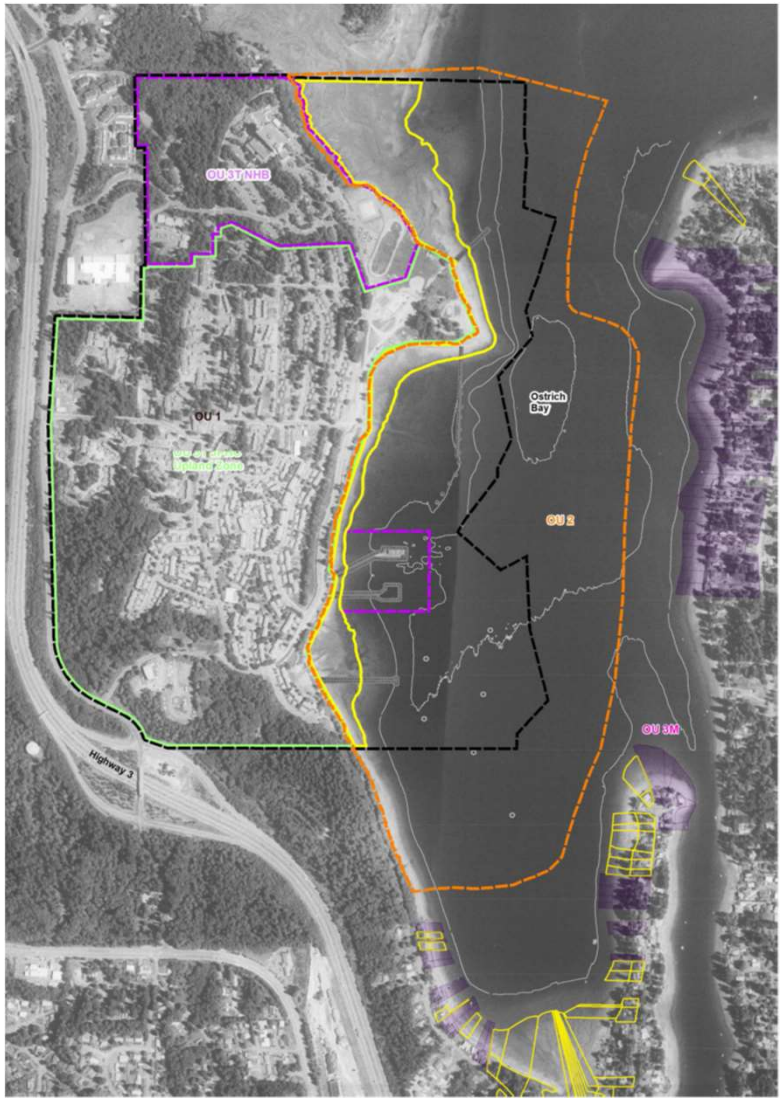


Cost Savings

- **True Cost Savings Realized**
  - **Not having to demobilize and remobilize crews.**
  - **Project Management Cost Savings.**
  - **Savings in Plans by being able to eliminate versions**
  - **Not implementing Shore line Remedy – Savings of $2-3 million.**
  - **Not having to stop and write another ROD Amendment.**

Other Benefits

- Project Team is on other projects.
- Same Regulator, Tribe, other stakeholders.
- Able to leverage relationships to advance other projects.
- Progress being made on previously stalled projects.



Knowledge Check

1. T/F Your regulator is your friend?

2. T/F You and your regulator need to agree on everything to get along.

2. Is your regulator there to impede or help site progress?

3. The benefits of involving your stakeholders in the process include (more than 1?):
    A. More minds
    B. Everyone agrees
    C. Make progress
    D. Can save time and/or money

Summary

- Your Regulator is going to be there.
- Stakeholders may have extensive site knowledge.
- The Us vs Them mentality slows progress, may increases costs.
- Make the most of them by making them a part of your team.
- Beneficial to use tools including modeling and presentations to convey information to the team.
- Valuable to meet in person with project team and stakeholders.

Contacts and Questions

Points of Contact

NAVFAC NW: Phil Nenninger

Email: philip.nenninger@navy.mil

NAVFAC EXWC: Jennifer Segura

Email: jennifer.segura@navy.mil

Questions ?